

## ON A COLLECTION OF ORCHIDS FROM LAOS

by

Allen D. Kerr<sup>1</sup>

For the past several years, since the beginning of 1965, the author has been in process of forming a collection of the orchids of Laos representative mainly of the Vientiane Plain and the areas immediately adjacent thereto. Since this area is rapidly being converted to rice and farm land, it is possible that some species will disappear, and this list of species is therefore submitted for the record. Some few species collected on an occasional trip outside the area are also included. Collecting trips were made almost weekly insofar as weather and security conditions permitted, and it is believed that the listing of epiphytic orchids for the Vientiane Plain is reasonably complete; however, there is reason to believe that many more terrestrial species exist within the area.

The mountain ridge, Phou Khao Khouai (Buffalo Ridge; spelled Boa Kao Kwai by Dr. SEIDENFADEN in his article of Jan. 1966) has however, been scarcely scratched. It is unfortunate that security conditions have precluded extensive exploration of this area, which is very rich both in terrestrial and epiphytic orchids.

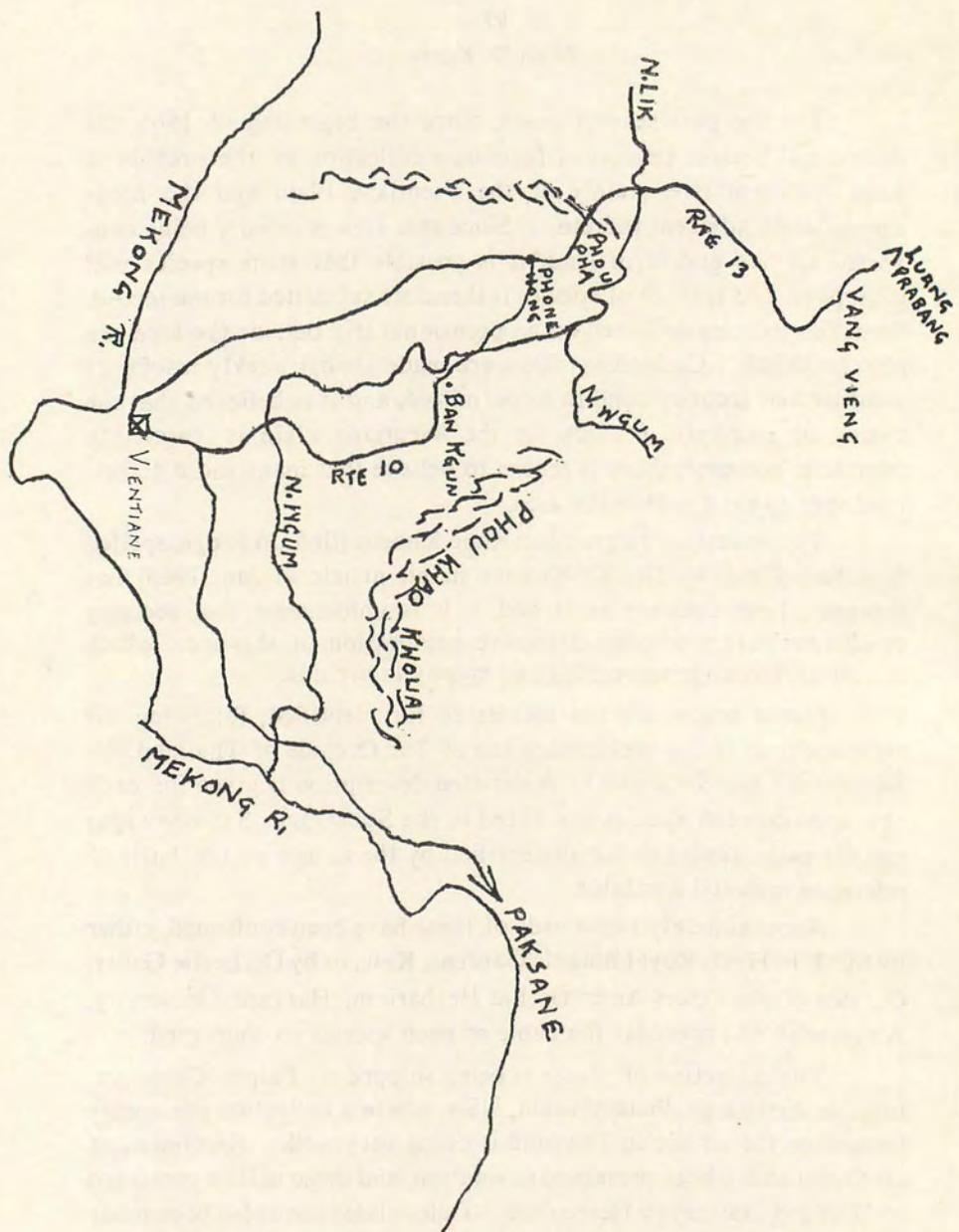
Listed below are the species so far identified, following the same order as in the preliminary list of The Orchids of Thailand, by SEIDENFADEN and SMITINAND. A detailed description is given for each new species, each species not listed in the SEIDENFADEN-SMITINAND *opus* and for each species so far unidentified by the author on the basis of reference material available.

Approximately two-thirds of these have been confirmed, either by Mr. P.F. HUNT, Royal Botanic Gardens, Kew, or by Dr. Leslie GARAY, Curator of the Oakes Ames Orchid Herbarium, Harvard University. An asterisk (\*) precedes the name of each species so confirmed.

The collection of plants is being shipped to Phipps Conservatory, in Pittsburgh, Pennsylvania, USA, where a collection previously formed by the author in Thailand is doing very well. Specimens of all flowers have been preserved in solution, and these will be presented to Harvard University Herbarium. Color slides have also been made of every blooming plant, and are in the possession of the author.

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1) Address: U.S. Embassy, Vientiane



Map showing Vientiane Plain.

*Paphiopedilum concolor* (BATEM.) PFITZ. Limestone hills to east and north-east of Thakhek; quite common, (ADK 0815). Blooms in March and irregularly thereafter.

*Paphiopedilum callosum* (RCHB. F.) PFITZ. Phou Khao Khouai, 1000m, complete shade, fairly common within a restricted area, (ADK 0895). Blooms in June.

*Brachycorythis helferi* (RCHB. F.) SUMMERHAYES. Summit Phou Pha, 700m, relatively common. These plants differ from the description, in that the vegetative parts correspond to *B. acuta*, while the pure white flower is *B. helferi*. A variety grows in same area with spur, lower 7mm of petals and sepals, both inside and out and the base of column are colored bright violet. Blooms in July.

*Habenaria* sp. ADK 2681. Close to *H. malintana*. Vientiane Plain. Blooms in August.

Terrestrial. Small, elliptical tubers,  $12 \times 8 \times 4$  mm, brown, wrinkled. Roots few, to about ten, from stem between tuber and leaves. Leaves 2, one large, one small, roughly heart-shaped with short point, flush with surface of ground; 4cm diameter; sheath around inflorescence 3mm long; surface completely covered with small warts, giving pebbly appearance; surface appearance of a transparent coating over the leaf; thick and unbending. Inflorescence to 20cm, scape 12cm, rachis 8cm; 1mm thick, slight swelling at bracts, light green. 3 sterile bracts, evenly spaced along scape, pale green,  $10 \times 4$  mm, sharply pointed. Flower bracts  $8 \times 4$  mm, tight against pedicel, sharply pointed, rigid. Pedicel/ovary  $10 \times 2.5$  mm, thickest at center, strongly lined and grooved, not twisted, very hard and rigid. Flowers to about 6, partially open,  $6 \times 7$  mm; light green, column dark emerald green; to about 2cm apart, facing in all directions; no spur; sepals and petals pointed forward, V-shaped, with all edges turned in; keel on back, tips blunt and turned in. Dorsal sepal  $7 \times 5$  mm, hooded, widest just above base, 5 strong ridges on reverse. Lateral sepals  $6.5 \times 2$  mm, widest just above base, 3 strong ridges on reverse, paling almost to white at base. Petals  $6 \times 2$  mm, widest just above base. Lip  $6 \times 3.5$  mm, simple, similar to lateral sepals, with green tip, white base, keeled on reverse. Column mostly anther, 2mm high, 3mm wide across top, with auricles, tipped with white globules, bright green with vertical white stripe. Pollinia 2, white, waxy, globular on tips of black green caudicles, with black green rostellum vertically between; rostellum rounded tip. 2 black green auricles curving forward from base of column, rounded with very very small point. Stigmata 2, gray-white, globular, at base of lip and auricles.



Column group  
(not to scale.)

\**Habenaria hosseusii* SCHLTR. Vientiane Plain, (ADK 1474). Fairly common near rice fields; blooms in September.

\**Habenaria rhodocheila* HANCE. Phou Pha, (ADK 1346, 2324); Phou Khao Khouai, 1000m, (ADK 2255). This is the rose red variety; blooms in August.

\**Habenaria chlorina* P. & R. Vientiane Plain, (ADK 1616). Fairly rare; blooms in October.

\**Habenaria recurva* ROLFE ex DOWNIE. Vientiane Plain, (ADK 1204). Common in cleared woods; blooms in July.

\**Habenaria roseata* RIDL. Vientiane Plain, (ADK 2370). Usually near borders of rice fields; blooms in August.

\**Habenaria porphyricola* SCHLTR. Vientiane Plain, (ADK 1467). Extremely rare, found only once; blooms in September.

*Habenaria* sp. ADK 2673. Vientiane Plain. Blooms in August.

Terrestrial. Tuber underground,  $3 \times 1.4$  cm, cylindrical, brown. Roots few, from base of stem. Leaves at base, sheathing stem, 5, from  $10 \times .9$  cm to  $15 \times 5$  mm, lowest; bright green; sharply pointed; one strong vein each side of center, near outer edge. Inflorescence terminal, 53 cm long, scape 32 cm, rachis, 21 cm; green; rachis finely ridged; 6 sheath bracts, lowest  $30 \times 6$  mm diminishing upward to top,  $7 \times 2$  mm, sharply pointed. Flower bracts  $7 \times 2$  mm, sharply pointed. Pedicel and ovary 15 mm, thickest on lower 3/4, very thin at flower; ridged, twisted 90° at base. Flowers  $8 \times 8$  mm, many, full open, facing in all directions, well-spaced, blooming from the top; emerald green, with long spur. Dorsal sepal  $3.5 \times 2$  mm, joined to petals, forming hood over column, widest at center, small point, dark green. Lateral sepals  $4 \times 2$  mm, curled into tube, reflexed back against pedicel, blunt tip. Petals  $3 \times .5$  mm, curved along edges of dorsal sepal, round tip, light olive green. Spur light olive green, 17 mm long, .5 mm thick to 1 mm near tip, laying under pedicel and following angle near flower; tip somewhat thickened, point blunt. Lip trilobed, with sidelobes at 45° angle from midlobe. Side lobes  $4 \times .7$  mm at base, narrowing to point. Midlobes  $4 \times 1$  mm, tongue-shaped, angled downward near base. Column short, with 2 pale green stigmata projecting from each side of base, curving slightly upward; pollinia in pale, erect tubes, on each side of rostellum, with caudicles projecting slightly forward at base; pollinia 2, waxy, yellow, irregular.

\**Habenaria medioflexa* TURRILL. Phou Khao Khouai, 500m, (ADK 1569). Not common; blooms in October.

\**Peristylus goodyeroides* LINDL. Vientiane Plain, open woods, fairly common, (ADK 2551). Blooms in June.

\**Pecteilis susannae* (L.) RAFIN. Vientiane Plain, open woods, fairly common, (ADK 2300). Blooms in July.

*Vanilla aphylla* BL. Vientiane Plain, (ADK 1308); Phou Khao Khouai 300m, (ADK 0772) Fairly common; blooms in August.

*Nervilia calcicola* KERR. Vientiane Plain, in deep shade, (ADK 1197). Fairly common; blooms in May.

*Nervilia discolor* (BL.) SCHLTR. Vientiane Plain, deep shade, (ADK 2041). Not common; blooms in May.

*Nervilia*, cf. *maculata* (P. & R.) SCHLTR. Vientiane Plain, deep shade, (ADK 2040). Not common; flower not seen.

\**Nervilia aragoana* GAUD. Vientiane Plain, deep shade, (ADK 1280) Quite common; flower not seen.

*Nervilia* sp. ADK 2664. Vientiane Plain, deep shade. Small, ovoid, white bulb, 10×6×6mm. Stem short, 1cm; leaf heart-shaped, 3.6×4.5cm, 10 major veins radial, very small point; green covered with fine white hair. Flower not seen.

\**Zeuxine tonkinensis* GAGNEPAIN. Vientiane Plain, bamboo groves, (ADK 1581). Quite common, bloom in October-November.

Terrestrial, tuberous root. Plant to 25-30cm tall, stalk at base 5mm thick; leafy to start of rachis, eight or more leaves, decreasing in size toward top. Leaves, oval, sharp point, 4-6cm×2cm wide. Inflorescence to 15cm long; inflorescence, bracts, pedicel, petals and sepals covered with soft gray hair. Rachis 5cm long, two sterile bracts. Many flowers, 20 or more, placed spirally, 2cm between vertical flowers. Bracts 20×2mm, decreasing to hairlike tip. Pedicel 7mm, twisted. Petals and sepals gray green, paling to white at the tips. Dorsal sepal joined to petals to form a cape, 2.5×2mm, rounded tip. Lateral sepals 4×2mm, blunt tip, enclosing base of lip. Very small flower opening, circular, about 1.5mm. Lip narrow at base, joined by claw to saccate base, transversely widened to 4.5mm at tip; bilobed, round lobes at 90° to each other, white. Column short, 1.5mm with appendages on side. Anther red, resting on deeply divided rostellum. Stigmata two, on each side of column. Pollinia, two, 1mm.

*Coelogyne* cf. *laotica*; not yet flowered. Bolovens Plateau, 1000m, (ADK 1658)

*Coelogyne huettneriana* RCHB. F. Vientiane Plain, (ADK 1536). Blooms in, October.

*Coelogyne trinervis* (LINDL.) WALL. Vientiane Plain, (ADK 0021). One of the most common species; blooms in October.

*Coelogyne rhodeana* RCHB. F. Phou Khao Khouai, summit, 1500m, (ADK 1842). Quite localized. Blooms in April.

*Panisea uniflora* LINDL. Base of Phou Khao Khouai, along river bed, extremely humid, (ADK 2526). Blooms in May.

*Pholidota pallida* LINDL. Vientiane Plain, very common in the jungle areas, (ADK 0107). Blooms in August.

\**Pholidota* GT 426. Phou Khao Khouai, 1000m, (ADK 1000); Bolovens Plateau, 1000m, (ADK 1649). Blooms in June-July.

\**Malaxis latifolia* SM. Vientiane Plain, not too common, (ADK 1162). Blooms in May. Variety (ADK 1168) with deep port red flowers, yellow anther.

\**Malaxis reniloba* (CARR) HOLTT. Vientiane Plain, (ADK 1312) Blooms in June.

*Malaxis* sp. ADK 2610. Vientiane Plain, (ADK 2610). Blooms in July.

Terrestrial. Pseudobulbs green, 20×12mm, conical, 2 internodes, ridged. Stem 32mm long, sheathed with leaf stalks. Leaves 6, plus one basal sheath 13×9mm, pointed. Lowest leaf 20×10mm at base; 2nd, 34×24mm, plus 23mm stem, almost oval; 3rd, 75×31mm, stem 25mm; 4th, 90×32mm, stem 30mm; 5th, 90×26mm, stem 25mm; 6th, 60×12mm, stem 20mm. Bright green, slightly plicate, 3 veins on 1st, 2nd and 6th, 5 on 3rd, 4th and 5th; widest at center, sharply pointed; no joint. Inflorescence terminal, erect, 11cm; scape 7cm, bright green, with 5 dark green ridges. Flower bracts 5×1mm, dark green, sharply pointed, pointing downward along stem. Pedicel and ovary 7mm, light green, ridged. Flowers many, 12×12mm, well-spaced to about 7mm apart, facing in all directions, full open, blooming successively from the bottom; olive-yellow with center of lip and column emerald green; lip at top of flower. Dorsal sepal 6×2mm, pointing downward, parallel to rachis; central 3/4 edges curled under forming tube; tip round. Lateral sepals 6×3mm, upper edge, straight, lower edge round, curled under; tip slight point; widest at base. Petals 5×1mm, pointing down and back at 45° angle, curled into tube almost entire length. Lip 8×6mm, trilobed, almost perfectly circular and flat, except for 3mm tip bent forward, cleft, each side round. Auricles (sidelobes) 2.5mm long, tip rounded, separated by dorsal sepals, surrounding column; triangular hollow at base of column. Column very short, 1mm, 1.5mm wide, with round wings projecting forward from top half of sides. Anther gray-white, tip pointing upward, located at back of column top. Pollinia 4, 2 pair of 2, yellow, waxy, no caudicles.

*Oberonia calcicola* HOLTT. Vientiane Plain, dipterocarp forest, (ADK 0030). Fairly common; blooms in September-October.

*Oberonia ensiformis* LINDL. Vientiane Plain, jungled areas; not common, (ADK 0389). Blooms in November.

*Oberonia iridifolia* (ROXB.) LINDL. Vientiane Plain, dipterocarp forest, (ADK 1123). Blooms in September-October. var. *denticulata*. Bolovens Plateau, (ADK 1887). Blooms in September.

*Liparis* sp. ADK 2641. Vientiane Plain, (ADK 2641). Blooms in July.

Possibly *L. odorata*

Terrestrial. Small, white pseudobulb, oval, 12×10mm, covered with leaf sheaths; roots from base. Leaves 3-4, not joined, plicate, sharply pointed, 3 major nerves. Lowest 5×4mm; 2nd 25×6mm; 3rd, 70×12mm; top, 85×12mm; sheath extension 15mm in all cases. Bright green. Inflorescence terminal, 21cm; scape 12cm; with square ridges, pale green. 4 sterile bracts, horizontal or projecting downward against stem; 5×1.5mm, sharply pointed. Flower bract 3×1mm, pale green, sharply pointed, resting against pedicel. Pedicel and ovary 5mm, pale green, twisted 90°. Flowers many, 4mm wide, 8mm tall, yellow to greenish-yellow, blooming successively from base, with fully formed seed pods at base before top; flowers open; well-spaced, to 6mm apart, facing in all directions. Dorsal sepal 4×1.5mm, curved down and back at 120° from column, edges folded down forming closed tube; tip round. Lateral speals 4×1.5mm, coming out from beneath lip, diverging to form "V", top edge folded over bottom with edges touching; tip round. Petals 3×.5mm, very close together, curving down and slightly forward; edges curled under forming tube. Lip simple, 4×3mm, bent at 90° angle down, back from center; tip round with very short pointed tip; 2 conical calli on basal section, just before fold; center of apical section emerald green. No spur. Column 3×1mm, curved slightly forward; square wings 1mm high, lighter in color, either side of top face; no column foot. Anther small, green-yellow, sitting on forward tip of column, 2 chambers, connected to rear of column. Pollinia 4, 2 pair of 2, yellow, waxy, no caudicles.

*Liparis longiscapa* (ROLFE) GAGNEPAIN. Vientiane Plain, (ADK 2582). Blooms in July.

\**Liparis sutepensis* ROLFE ex DOWNIE. Vientiane Plain, (ADK 1191). Quite common; blooms in June.

\**Ephemerantha fimbriata* (LINDL.) P.F. HUNT & SUMMERH. Phou Khao Khouai, 1100m, (ADK 0872). Quite common; blooms from June on.

*Dendrobium aggregatum* ROXB. Vientiane Plain, (ADK 0100). Quite common throughout the area; blooms in February.

*Dendrobium trigonopus* RCHB. Phou Khao Khouai, summit, 1800m, (ADK 2479). Rare; blooms in April-May.

*Dendrobium senile* P. & R. Phou Khao Khouai, near summit, 1500m, (ADK 2225). Not common; blooms in January.

*Dendrobium chrysotoxum* LINDL. Phou Pha, (ADK 0104); Phou Khao Khouai; Phou Bia, (ADK 1600). Quite common; blooms in March. There appear to be several varieties, differing in vegetation.

*Dendrobium palpabrum* LINDL. Vientiane Plain, (ADK 0625). Quite common; blooms in March.

*Dendrobium moschatum*, var. *cupreum* SW. Vientane Plain, (ADK 924). There appear to be two varieties of this species, one as above blooming in May; the other (ADK 1075) blooming in July. In the second variety, buds mature and drop off, but do not open, in most cases.

*Dendrobium pulchellum* ROXB. Vientane Plain, (ADK 0670). Scattered and not very common; blooms in March.

\**Dendrobium binoculare* RCHB. F. Vang Vieng, (ADK 2126). Blooms in May.

*Dendrobium dixanthum* RCHB. F. Source unknown, (ADK 1998). Blooms in March.

*Dendrobium hildebrandii* ROLFE. Paksane area, (ADK 1854) identification not confirmed; blooms in February.

*Dendrobium devonianum* PAXT. Paksane area, (ADK 0837). Blooms in March.

*Dendrobium nobile* LINDL. Vientane Plain. Blooms in March. This appears to be a highly variable species, even within a specific area; typical specimen (ADK 0479) is plain, without eyes, and with little twist to the petals; it occurs also with large, connected eyes, deep purple (var. *oculatum*, ADK 0731); small, deep red violet eyes, not connected (var. *mini-oculatum*, ADK 0476); and vertical, twisted petals (var. *tortile*, ADK 1954). Further analysis is necessary to determine if these are all one species.

*Dendrobium crassinode*, BENS. & RCHB. F. Xieng Khouang area, (ADK 0105). Will not live in Vientiane; blooms in March.

*Dendrobium lituiflorum* LINDL. Vang Vieng area, (ADK 1305). Blooms in March.

*Dendrobium hercoglossum* RCHB. F. Vang Vieng, (ADK 2138); Phou Khao Khouai, 500m, (ADL 1721). Blooms in May.

\**Dendrobium aphyllum* (ROXB.) C.E.C. FISCHER; Syn. *D. pierardii* ROXB. Vientiane Plain, very common, (ADK 0843). Blooms February to July. There are several varieties.

*Dendrobium primulinum* LINDL. Vientiane Plain, quite common, (ADK 0641). Blooms in March.

\**Dendrobium bellatulum* ROLFE. Bolovens Plateau, 1000m, (ADK 1645). Blooms in December.

*Dendrobium scabrilingue* LINDL. Phou Khao Khouai, summit, 1500m, (ADK 1770). Blooms in January.

*Dendrobium draconis* RCHB. F. Vientiane Plain; is being exterminated for the market, (ADK 0695). Blooms in February-March.

\**Dendrobium sculptum*, RCHB. F. Phou Khao Khouai, 1000m, (ADK 0984). Not common; blooms in August.

Epiphyte, Nigrohirsuta group. Pseudobulbs and leaves tomentose, pseudobulbs more than 55cm long, 1cm thick. Leaves alternate, 8 × 3.3cm, dark green, unequally bilobed. Flowers on old pseudobulb, two to three years on one pseudobulb. Inflorescence opposite leaves, lateral and apical. Inflorescence 2cm long, two to six flowers, white. Pedicel 3.5cm. Flowers facing in all directions. Sepals tortoise and wavy edged, petals wavy edged. Dorsal sepal 26×9mm, five veins. Lateral sepals 30×10mm, five veins. Petals 30×15mm, seven veins. Lip, three-lobed, 30mm long, 21mm across side lobes, 19mm across front lobe. Front lobe cleft at tip, with strong central vein. Small red mark at midlobe, 3×2mm. Spur 24mm, rose pink inside. Column foot bright rose. Column 8×5mm. Anther cap touch of rose in center. Pollinia 1 pair, yellow.

*Dendrobium delacourii* GUILL. There are two distinct varieties subsumed under this species. Var. *major*: The pseudobulb is 36cm or longer, with as many as eight inflorescences on a single stem; the flowers are yellow and olive-green, (ADK 0081). Var. *minor*: The pseudobulbs measure 30×14mm, with usually one, not more than two inflorescences; the flowers are greenish white, (ADK 0083). The details of vegetation and flower are identical. Both are very common, growing in the same areas. Var. *major* blooms in July, var. *minor* blooms in April. Var. *minor* was originally called *D. ciliatum*.

\**Dendrobium trinervium* RIDL. Vientiane Plain, dense jungled areas, fairly common, (ADK 0330). Blooms in July and continuously thereafter.

\**Dendrobium cumulatum* LINDL. Phou Khao Khouai, 500m, (ADK 0983). Blooms in August-September.

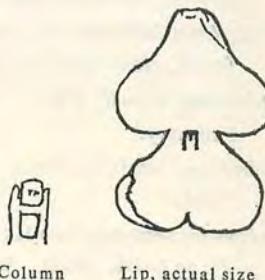
Var. *alba*: column and anther pure white instead of bright violet.

*Dendrobium secundum* (BL.) LINDL. Vientiane Plain, open forests, (ADK 0089). Quite common; blooms in February.

*Dendrobium revolutum* LINDL. Phou Khao Khouai, 1300m, (ADK 0882). Blooms in February and thereafter.

*Dendrobium crumenatum* SW. Unknown source, south Laos, (ADK 2000). Blooms periodically after March.

\**Dendrobium acinaciforme* ROXB. Vientiane Plain. Quite common throughout the area. Both Type A (ADK 0076) and Type B (ADK 0075) grow in same areas. Blooms in May-June.



Column      Lip, actual size

*Dendrobium indivisum* (BL.) MIQ. Vientiane Plain, dipterocarp forest, (ADK 0067). Blooms in March.

\**Dendrobium indivisum* var. *lampangense* ROLFE. Vientiane Plain, dipterocarp forest, along with *D. indivisum*, (ADK 0068). Blooms in April.

*Dendrobium manni* RIDL. Vientiane Plain, (ADK 0303). Blooms in February.

*Dendrobium leonis* (LINDL.) RCHB. F. Unknown point, South Laos, (ADK 2354).

*Dendrobium kentrophylum* HK. F. Bolovens Plateau, 1000m, (ADK 0975); Vang Vieng (ADK 2063). Blooms in September.

*Dendrobium* cf. *salaccense*. Vang Vieng, (ADK 2058). Definite identification withheld until flowering.

\**Dendrobium pachyglossum* P. & R. Phou Pha, (ADK 0807); Phou Khao Khouai, (ADK 1766). Blooms from July on.

*Dendrobium arachnites* RCHB. F. Phou Khao Khouai, 1000m, rare, (ADK 1960). Blooms in July.

Epiphyte. Bloom on old pseudobulb, 30×10mm, red brown, tiered. New pseudobulb, five or more leaves; leaves 4×1.2cm, pointed, purple-edged. Flowers group of three, peduncle minimal. Pedicel 3cm. Pedicel and dorsal and lateral sepals and petals brilliant pure orange. Dorsal sepal 28×4mm; lateral sepals, 23×3mm; petals 26×4mm. Lip 21×6mm; totally enclosing column, yellow, striated orange; yellow ridge along center line; edges wavy. Column white, 2×1mm.

\**Eria dasypylla* P. & R. Phou Pha, (ADK 0547) and Phou Khao Khouai, (ADK 1930). Common; blooms in June-July.

\**Eria perpusilla* P. & R. Phou Khao Khouai, 1000m, (ADK 0955); Phou Pha 700m, (ADK 1374). Blooms early February.

\**Eria muscicola* LINDL. Phou Khao Khouai, 1500m, (ADK 1811). Blooms in August.

\**Eria javanica* (SW.) BL. Vang Vieng, (ADK 2145). Blooms in August.

*Eria albido- tomentosa* (BL.) LINDL. Vientiane Plain, (ADK 2319). Blooms in September-October.

*Eria tomentosa* HOOK. Phou Pha, 700m, (ADK 0542); Phou Khao Khouai 1000m, (ADK 2281). Blooms in February.

*Eria ornata* LINDL. Vientiane Plain, (ADK 686). Rare, blooms in May.

*Eria pulchella* LINDL. Phou Pha, 800m, (ADK 0793). Blooms February.

\**Eria pannea* LINDL. Bolovens Plateau, 1000m, (ADK 1648); Phou Khao Khouai, 1500m, (ADK 1776) Rare; blooms in December-January.

*Eria paniculata* LINDL. Bolovens Plateau, 1300m, open forest, (ADK 1891). Blooms in February.

*Eria bractescens* LINDL. Vientiane Plain, dipterocarp forest, very common, (ADK 0022). Blooms in February-March.

*Eria cf. spicata* (DON) HAND.-MAZZ. Vang Vieng, (ADK 2069). Definite identification pending. Blooms in August-September.

*Eria acervata* LINDL. Phou Bia, 1500m, (ADK 1609); Vang Vieng, (ADK 2168). Blooms in June.

\**Eria amica* RCHB. F. Phou Pha, 600m, (ADK 0618); Phou Khao Khouai, 1500m, (ADK 1783). Quite common; blooms in September.

\**Eria* sp. ADK 762. Phou Pha, 300m, (ADK 762); Phou Khao Khouai, 1000m, (ADK 0938). Blooms in August.

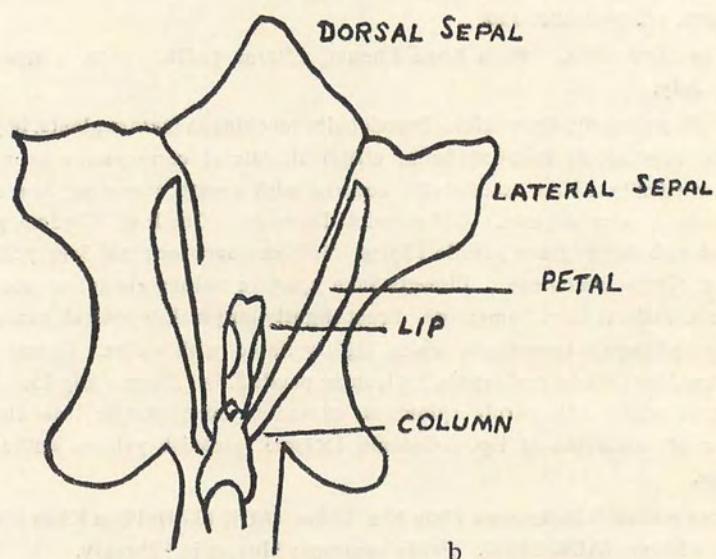
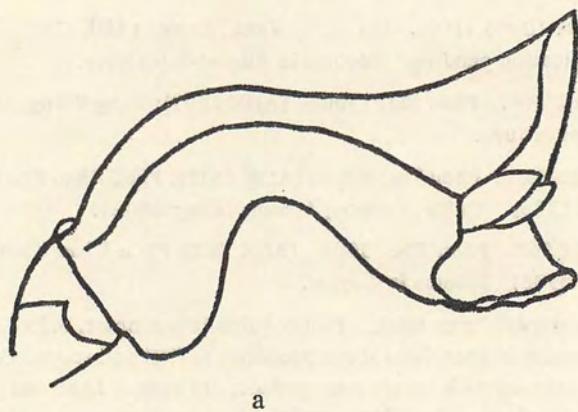
Roots sturdy, 3mm thick. Pseudobulbs 10mm apart,  $3.2 \times 1.2$  cm, cylindrical, narrowing to apex, lateral compressions at first and second thirds. New pseudobulb covered with sheath over petiole; old nude. Leaf one, sometimes two on young plant,  $19 \times 2.2$  cm, petiole 3cm, glossy green. Scape 15mm, inflorescence terminal, 3.6cm long, 11 flowers; flowers 1-2mm apart on stem, facing in all directions, in oblong cluster, Pedicel 2mm. Bract as long as, or slightly longer than pedicel. Pedicel, bract, scape, flowers tomentose. Flower all waxy white, except lip flushed with palepurple. Dorsal sepal,  $3 \times 2$  mm; lateral sepals,  $4 \times 2.5$  mm; petals,  $3 \times 1$  mm; lip  $3 \times 2$  mm, trilobed, arched; column  $1 \times 1$  mm, yellow anther cap.

*Eria* sp. ADK 1933. Phou Khao Khouai, 1500m, (ADK 1933). Blooms in July.

Roots sturdy, 4mm thick. Pseudobulbs touching in mature plants, in young plants, 1cm apart; to  $30 \times 18$  mm, elliptical, lateral compression in middle, lined vertically. New pseudobulbs covered with sheath extending 2cm above pseudobulb over petiole. Old pseudobulbs nude. One leaf,  $17 \times 3$  cm, green, veined with darker green petiole 15mm. Inflorescence terminal 5cm, peduncle 15mm, finely tomentose. Flowers 5mm apart in oblong cluster to about 16 flowers. Pedicel 3mm, tomentose. Bract slightly longer than pedicel, persistent. Petals and sepals tomentose, white, lightly tinted with violet. Dorsal sepal  $4 \times 2$  mm, blunt tip; lateral sepals,  $3 \times 1.5$  mm; petals  $2.5 \times 1.5$  mm. Lip  $2 \times 1.5$  mm, trilobed, white with purple splotches, curved in bow; purple line through center of underside of lip. Column  $1 \times 1$  mm, greenish yellow, anther cap yellow.

\**Porpax reticulata* (unknown) Phou Pha, 800m, (ADK 1374); Phou Khao Khouai, 1500m, (ADK 1814). Fairly common; blooms in February.

Sympodial epiphyte or lithophyte. Pseudobulbs small, disc-shaped, contiguous, 12mm diameter, 2mm thick; covered with papery sheath, gray, heavily lined, lines radiating from side. Leaves 2, to  $30 \times 10$  mm, from under edge of pseudobulb, tip sharply pointed and turned under, edges wavy; widest



*Porpax reticulata.* a. Flower side-view; b. Flower dissected from spur.

below center. Flowers single, from under side of pseudobulb, near center, dark maroon; pedicel 4mm long, completely covered by light green bract; bract 6mm long, 6mm wide at tip. Flower in shape of tube with dorsal and lateral sepals joined, petals and lip inside; bent at 90° angle; 12mm long, 6mm high at tip, 4mm wide, end flared. Dorsal sepal 10×5mm, square tip, flared out at tip. Lateral sepals 8×4mm, widest at tip, bent forward at 90° angle, round tip, joined along column foot. Petals entirely enclosed, 9×1mm, joined to upper edge of lateral sepals, S-shaped, blunt tip, same width throughout. Lip entirely enclosed, joined to column foot, 3.5mm long × 2mm wide, curved forward, sides raised, indistinctly trilobed; tip slightly round, cleft, lightly fringed; sides of side lobes bent toward center. Column foot curved down and forward 3×1.5 mm, center depressed. Column 1.5×1mm, triangular horns either side of anther; prominent, lighter-colored rostellum. Anther cap conical, round, joined by filament to top rear of column. Pollinia 4, yellow, club-shaped. Flower juicy, leaves red stain when cut. Blooms from leafless pseudobulb.

*Ceratostylis* cf. *siamensis* ROLFE ex DOWNIE. Pha Pek, 1300m, (ADK 2011).  
Blooms in March.

\**Agrostophyllum khasianum* GRIFF. Phou Pha, 700m, (ADK 0517); Phou Khouai, 200m, (ADK 1351); Vang Vieng, (ADK 2111); Paksane, (ADK 1872). Blooms in July.

\**Bromheadia aporoides* RCHB. F. Vientiane Plain, (ADK 0097); Phou Khouai, 1600m, (ADK 1942). Blooms in March.

\**Polystachya flavescens* (BL.) JJS. Phou Khouai, 1100m, (ADK 0996); Bolovens Plateau, 1000m, (ADK 1676). Blooms in September.

\**Calanthe cardioglossa* SCHLTR. Phou Pha, 600m, (ADK 0587). Blooms in January.

\**Spathoglottis lobbii* RCHB. F. Vientiane Plain, (ADK 0134); Phou Khouai, 1000m, (ADK 1575). Blooms in October.

*Bulbophyllum tripudians* P. & R. Phou Khouai, summit, 1800m, open forest, (ADK 2451).

*Bulbophyllum blepharistes* RCHB. F. Vientiane Plain, (ADK 0274). Blooms in September-October.

\**Bulbophyllum sutepense* (ROLFE) S. & S. Bolovens Plateau, 1000m, (ADK 1652). Bloomed in April.

*Bulbophyllum* cf. *picturatum* (LODD.) RCHB. F. Vang Vieng, (ADK 2054). Bloomed in June.

Conical pseudobulbs, very close together, 2cm tall, rough surface, leaves about 10cm long. Inflorescence 8.5cm, pedicel 4mm. Lateral sepals 16×3mm, joined along the upper part except for very tip, yellow, with four dotted red lines. Dorsal sepal 5×5mm, hooded, edges finely hairy, yellow,

with five red veins, pointed tip. Spur, round, 1mm. Petals,  $4 \times 2$ mm, Column yellow, with orange cap. Lip purple on top, yellow beneath, reflexed.

*Bulbophyllum* cf. *pulchellum* RIDL. Vang Vieng, (ADK 2175). Bloomed in August.

Sympodial epiphyte. Rhizome woody, 2mm thick. Pseudobulbs up to 1cm apart at base, curving upward from rhizome,  $3 \times 1$ cm, tapering toward top; new bulbs completely covered with leafy sheath, extending above petiole; older pseudobulbs wrinkled. Leaves  $15 \times 2.3$ cm, elliptic, round tip, short twisted petiole. Inflorescence from base of pseudobulb, 8.5cm, purple and yellow, one sterile bract near base. Pedicel 8mm, purple spotted, 3mm bracts. 6 flowers in drooping fan. Dorsal sepal  $7 \times 5$ mm, yellow, striped and edged in purple, hooded, pointed; edges faintly serrate. Lateral sepals  $24 \times 4$ mm, joined along column foot, yellow-green at base, shading quickly to dark brown-purple; joined together along top approximately 1cm from base almost to tip; underside lighter in color, heavily striped at base. Petals  $4 \times 2.5$ mm, yellow green, striped with purple, pointed. Lip hinged to column foot, semi-circular, tongue-shaped; 3mm long purple with yellow-green in central depression. Column foot yellow, heavily spotted with purple; column same,  $1 \times 1$ mm, with very short erect horns beside anther cap; cap dark purple; pollinia pale yellow, two pair of 2.

*Bulbophyllum lepidum* (BL.) JJS. Vientiane Plain, rain forest, (ADK 0017). Blooms in September-October.

*Bulbophyllum* sp. ADK 2178. Phou Khao Khouai, 500m, (ADK 2178). Bloomed in November.

Sympodial epiphyte. Rhizome 3mm thick, covered with sheaths, 15mm between pseudobulbs. Pseudobulbs  $35 \times 13$ mm, ovoid and lightly ridged when new; quadrangular and deeply ridged when old; new covered with brown-black sheaths; sheath  $3.5 \times 2$ cm, heavily lined. Leaves to  $17 \times 3.5$ cm, twisted 90° at base, widest at center, many bright green veins stand out, about ten each side of center vein; petiole about 1cm long; tip shortly pointed. Inflorescence from base of pseudobulb, 17cm long; green, heavily blotched with maroon; 3 sterile bracts  $18 \times 6$ mm; pedicel 1cm long, off-white, heavily dotted with maroon, ridged, slightly twisted. Bracts  $12 \times 2$ mm, off-white, pointed. Flowers eight, in umbel, off-white, lightly lined with purple. Dorsal sepal and petals fringed with white hairs 1mm long. Dorsal sepal hooded,  $12 \times 9$ mm, lateral sepals to 55mm long, joined at top and bottom near base, forming flat tube, 12mm, long  $\times 6$ mm wide; thereafter separate ending in fine filaments, almost 4cm long; attached to column foot. Petals  $9 \times 5$ mm, partially within lateral sepals; both pointed. Column foot off-white, turned up at the base in fish-hook arc, with lip attached at end. Lip hinged, off-white, trilobed; sidelobes

very shallow, base fleshy; midlobe tongue-shaped, arched, fleshy, two keels; 10mm. long. Column white, deeply recessed, sides embracing base of lip. Operculum very deep. Anther cap simple, dark eyes either side. Anther two-chambered; pollinia yellow, two pair of 2.

*Bulbophyllum* sp. ADK 2055. Vang Vieng, (ADK 2055.) Bloomed in July.

Epiphyte, probably *Cirrhopetalum* Section. Pseudobulb 10×5cm, touching, piled up, ridged finely, sheathed with fine hairs along ridges, brownish; no apparent rhizome. Leaves sessile, to 53×12mm, tips rounded off point, bright green. Scape to 2cm, green, from base of pseudobulb; flowers 3-4, on 3mm pedicel. Dorsal sepal hooded, translucent greenish-white, very finely veined with purple, 2.5×1.5mm, pointed. Lateral sepal same color, 7×1mm at base, narrowing gradually to fine point, almost at 90° to each other. Petals same color, 2×1.5mm, triangular. All very finely fringed, purplish. Lip 2×1mm. midlobe green with stripe extending to tip, edges deep violet, arc-shaped. Column white, 1.5×1mm, pollinia faintly purple.

*Bulbophyllum* sp. ADK 1133. Phou Pha, 500m, (ADK 1133). Blooms in October.

*Cirrhopetalum* Section; epiphyte, dark green, glossy leaves. Flower with joined lateral sepals, about 4cm long, all pale yellow, striped with burgundy; dorsal sepal heavily fringed, dotted; lip yellow, hinged.

*Bulbophyllum affine* LINDL. Bolovens Plateau, (ADK 1667); Phou Khao Khouai, 1500m, (ADK 1795). Bloomed in May.

*Bulbophyllum* cf. *tortuosum* (BL.) LINDL. Vientiane Plain, (ADK 1528). Blooms in October.

Small pseudobulbs, little larger than *B. sessile*, overlapping. Very small red flower at base, on very short pedicel.

\**Bulbophyllum sessile* (KOEN.) JJS. Vientiane Plain, (ADK 0248), Blooms in July and periodically thereafter.

\**Bulbophyllum clarkeanum*, K. & P. Vang Vieng, (ADK 2095). Blooms in August.

\**Bulbophyllum chlorostachys* SCHLTR. Phou Khao Khouai, 1300m, (ADK 0910). Blooms in October.

*Bulbophyllum rufinum* RCHB. F. Vientiane Plain, (ADK 0008). Blooms in November.

\**Bulbophyllum* sp. ADK 607; near *B. neilgherrense* WIGHT. Phou Khao Khouai, (ADK 0296); Phou Pha 600m, (ADK 0605.). Blooms December.

Rhizome woody, 3mm thick, about 2cm between pseudobulbs. Pseudobulbs sometimes appressed to rhizome sometimes at 45° angle; maroon color, covered

with sheaths when new to above petiole; normally four-sided, diamond shape in cross-section, widest near base, to  $5.5 \times 3$  cm. Inflorescence from base, to 33 cm long, drooping, maroon; scape 17 mm, with 3-4 sterile bracts to  $10 \times 8$  mm pointed, enfolding scape. Flowers well-spaced, crowded near tip, blooming first from bottom. Flower bract deep maroon,  $10 \times 2$  mm, pointed; pedicel 5 mm, maroon. Leaves deep purple maroon on both sides, to over  $15 \times 2.4$  cm, thick, coriaceous, equally rounded tip, widest at center; petiole 1 cm long, somewhat twisted. Dorsal sepal  $4 \times 2$  mm, hooded, pointed, olive green and maroon. Lateral sepals  $8 \times 3$  mm, joined to column foot; joined at both edges 2 mm from tip; olive green edged with maroon, sharply pointed. Petals very small, few fine hairs along edge, triangular, olive green and maroon, pointed,  $1.5 \times 1$  mm. Lip hinged on column foot, which tips up slightly at end; column foot deep violet, 2 mm long. Lip trilobed; sidelobes stick up like horns, forward-pointing, .8 mm high  $\times$  .4 mm wide, maroon. Midlobe 3.5 mm long, tongue-shaped, edges finely hairy and curved down; at  $90^\circ$  to base and sidelobes; small keel in cleft in center. Column  $2 \times 2$  mm, maroon; operculum olive green; projections of column forward of and higher than anther, ending in forward-pointing bright green horns. Anther cap bright green, simple, two-chambered. Pollinia yellow, 2 pair of 2.

*Bulbophyllum* sp. ADK 968. Phou Pha, 700m, (ADK 0608); Phou Khao Khouai, 1100m, (ADK 0977). Blooms in November.

Sympodial epiphyte.

Rhizome slightly over 1 mm thick, to 6 cm between pseudobulbs. Pseudobulbs ovoid when new, almost globular, 13 mm high, 13 mm diameter, covered with sheaths above petiole, apple green; when older, maroon color, heavily ridged, about six sections. Leaves to  $5.5 \times 2$  cm; upper surface grey green, maroon tinted, midrib maroon; elliptic, tip slightly and evenly bilobed; reverse side maroon, dull; petiole 2 mm, twisted. Inflorescence to 7 mm, from base of pseudobulb, pale violet; scape to 3.5 cm, 2 sterile bracts  $3 \times 8$  mm; pedicel 2.5 mm, greenish, maroon spotted; bracts 2 mm long, maroon, green, maroon striped; few flowers, up to about seven, in short head, fairly well-spaced. Dorsal sepal maroon, green tinged, hooded,  $3 \times 2$  mm, rounded tip; lateral sepals  $5 \times 2$  mm, joined along column foot, joined together at bottom at base and at top and bottom near tip, maroon with olive-green spots, glabrous; petals .8 mm, triangular, pointed, maroon. Lip joined to slightly upturned end of column foot on swivel, 2.2 mm long, maroon; base round, fleshy sidelobes like horns stretched up and forward, very dark purple, .4 mm high. Midlobe tongue-shaped, fleshy, covered with fine, dark hairs. Column foot maroon, color deeper on edges, curved. Column green with maroon stripes in center and at edges, 2 mm high, rising beside anther with broad squarish tip, surmounted by very short, abrupt point; operculum pale violet; anther simple, two-chambered, maroon. Pollinia 2 pair of two, yellowish, dotted with violet.

*Bulbophyllum* sp. ADK 2176. Vang Vieng, (ADK 2176). Bloomed in September.

Sympodial epiphyte. Rhizome 3mm thick, sheathed; pseudobulbs 5cm apart, nodes 12mm apart; roots at pseudobulbs only; flowers at nodes only. Pseudobulb to  $32 \times 12$  mm, laying along rhizome for 12mm, curving upward at 30° angle; older ridged, young smooth and oval;  $\frac{3}{4}$  covered with sheath. Leaves to  $9.5 \times 2.5$  cm, elliptic, very short point; petiole very short, twisted at 90°. Inflorescence 2-3cm, 3 sterile bracts; pedicel 6mm.

*Trias disciflora* (ROLFE) STAPF. Phou Khao Khouai, 500m, (ADK 1734). Bloomed in October.

*Drymoda siamensis* SCHLTR. Phou Khao Khouai, summit, 1800m, (ADK 2483). Bloomed in March.

*Geodorum* sp. DB 3355. Vientiane Plain, (ADK 1017). Blooms in May. Quite common.

\**Geodorum* sp. Ploenchit 1168. Vientiane Plain, (ADK 1068). Quite common; blooms in May.

\**Eulophia graminea* LINDL. Vientiane Plain, (ADK 1428). Fairly common; blooms in February.

*Eulophia keithii* RIDL. Source uncertain, (ADK 1750). Blooms in March.

*Eulophia* sp. GT 2906. Vientiane Plain, (ADK 2672). Blooms in August. Quite rare.

Terrestrial. Tuber irregular, underground, white, roughly triangular,  $3.5 \times 3.5 \times 3$  cm; leaves and inflorescence from tip of triangle, roots from lower half of tuber. Leaves 2, height including stem, 52cm. Leaf blade  $33 \times 4$  cm, plicate, lanceolate, sharply pointed, 4 major veins either side of center, light green, widest above middle. Lower leaf  $7 \times 1$  cm, sheathing stem. Sheath from base, 7cm tall. One sheath common to inflorescence and leaf stem, 5cm tall, brown. Inflorescence 45cm tall, scape 30cm, rachis 15cm. 5 sheath bracts, lower 3 brown, 5.5-6cm long, veined, pointed; upper 2 free, pale green, sharply pointed, 5 and 3cm. Inflorescence pale green, 4mm thick. Flower bracts  $17 \times 5$  mm, veined, widest near base, sharply pointed. Pedicel  $22 \times 2$  mm, bright green, twisted 90° near base. Flowers 16mm wide, 15mm high, 18mm long, yellow tinged with green, half open; petals and sepals pointing forward; 10 or more flowers, drooping, facing in all directions, well-spaced; short-hooked spur. Dorsal sepal  $17 \times 9$  mm, widest near tip, hooded slightly over column, 3 strong central veins, 3 minor veins each side, tip rounded, then curving out to a point. Lateral sepals  $18 \times 9$  mm, widest above center, strong central thickened vein, coming to a sharp point, joined to base of column. Petals  $13 \times 8$  mm, tip rounded, almost entirely hidden by sepals, widest at center, joined to back of column. Lip pale violet along edges, bright violet in center,

trilobed,  $15 \times 6$  mm across midlobe; sidelobes upright  $6 \times 2$  mm, edges fluted, pale violet, strong, white vein in center; waist pinched upward; midlobe  $8 \times 6$  mm, 5 parallel ridges, covered with papillae increasing in size and height toward tip.

Spur 8 mm, curved at  $90^\circ$  angle at 4 mm, shading from pale violet to yellow at tip; tip rounded, blunt. Column  $10 \times 3.5$  mm, no column foot, vertical wings each side, very pale yellow; rostellum prominent, square, with short, round beak, below anther beak. Anther pale yellow, conical; short, square beak, with horizontal dark purple cap at rear of anther; joined to rear of column; one chamber. Pollinia 2, yellow, cleft, broad stipes, 1.5 mm long.

Plant 2697: inflorescence 56 cm, leaves  $75 \text{ cm} \times 4.8 \text{ cm}$ .

*Eulophia* sp. ADK 1048. Vientiane Plain, (ADK 1048). Blooms in May to July.

Terrestrial. Pseudobulb below ground or on surface, irregular; on surface, bright green; 3.5 cm long, 2 cm wide, 1.8 cm high; 2 leaf scars plus small one at top, thick roots from anywhere below scars. Leaves and inflorescence bound together by 3-4 sheaths, brown or green, longest pointed, others blunt, to 3.2 cm long. Lower leaf sheath 6.5 cm tall, pointed; second, 14.5 cm tall, pointed, with top 5 cm free. Leaves 2, to 35 cm long from ground, 3.5 cm wide, widest near tip, sharply pointed, plicate. Inflorescence to 24 cm, scape 15.5 cm; 6 or more flowers, facing, in all directions, well-spaced; 2 sterile bracts, brown, sharply pointed, lower 4.2 cm, upper 3.5 cm, free. Flower bracts decrease in size toward top, lowest 3 cm  $\times$  3 mm, brown, sharply pointed; pedicel 17 mm, green, finely ridged. Flower 45 mm wide, 30 mm high; sepals wide open, green, pointed; dorsal and lateral sepals  $25 \times 5$  mm: petals form tube with lip, white, tip rounded  $20 \times 7$  mm, 7 veins. Lip trilobed, basal section green, remainder white; small emerald green spur,  $4 \times 1.5$  mm, tip rounded; 17 mm long, 9 mm across sidelobes, 7 mm across midlobe. Sidelobe  $10 \times 2$  mm, erect, pointed tip. Midlobe  $7 \times 7$  mm, round, tip pointed; 3 double bright green ridges running from base to base of midlobe. All surfaces rough, warty, and covered with hair, long on the midlobe. Column foot short,  $2.5 \times 2$  mm, very pale green. Column  $9 \times 2$  mm, same width to top, white; short, round, cleft rostellum. Anther cap yellow, blunt horn pointing backward; short, blunt beak; joined by thick filament to rear of column. Pollinia 2, yellow, ovoid; short, broad stipes.

*Grammatophyllum speciosum* BL. Phou Pha, (ADK 2357); Phou Khao Khouai 300 m, (ADK 2289). Rare.

*Cymbidium pubescens* LINDL. Vientiane Plain; very common, (ADK 0383). Blooms in March.

*Cymbidium simulans* ROLFE. Vientiane Plain. Quite common, (ADK 0064). Blooms in April.

\**Cymbidium ensifolium* SW. var. *roseum*. Vientiane Plain, (ADK 0599). Blooms in June-July.

\**Acriopsis indica* WIGHT. Phou Khao Khouai, summit, 1500m, (ADK 1832).  
Blooms in February.

*Thecostele alata* (ROXB.) P. & R. Vientiane Plain. Not common, (ADK 1126).  
Blooms in June

\**Thrixspermum leucorachne* RIDL. Vientiane Plain, (ADK 0310). Blooms in July  
and thereafter.

*Thrixspermum arachnites* (BL.) RCHB. F. Vang Vieng, (ADK 2079). Blooms in  
September.

*Thrixspermum* cf. *hystrix*. Vientiane Plain, (ADK 1759). Blooms in November.

Monopodial epiphyte. Stem 3mm thick, somewhat flattened, 1cm between leaves. Roots and inflorescence both from leaf nodes. Leaves to 6cm long by 12mm wide, tip cleft, unequally bilobed, many, well-spaced. Inflorescence to 7cm, 4 or 5 simultaneously, occasionally two at one leaf node; 2 leafy bracts to 5×1.5mm. Buds cluster at tip, one flower at a time, flowers facing in all directions. Flowers very short-lived, closing before noon. Flower bracts 4×1mm, pale green, sharply pointed. Pedicel 6mm, pale green. Petals and sepals pure white; dorsal sepal 7×3mm; lateral sepals 8×3.5mm; petals, 6.5×2mm; all pointed; outspread. Lip immovably joined to column foot saccate, 3-lobed. Sidelobes erect, hairy inside and along edges, 2.5mm high. Midlobe triangular, pointed, 1.5mm long; few brown spots on and under midlobe, and between sidelobes. Simple callus within front of sac. Column short, 1×1mm, distinct broad column foot, white, operculum deep, sides of column extending downward along column foot. Pollinia pale brown, 4, unequal, in 2 pairs; very short, broad stipes. Anther cap simple, two chambered.

*Thrixspermum* cf. *trichoglottis* HK. F. Vientiane Plain, (ADK 1217). Blooms in  
March and thereafter.

Monopodial epiphyte. Stem round, covered with leaf sheaths, 5mm thick. Wiry roots from internodes; leaves alternate; inflorescences opposite leaves. Leaf to 32mm, 7mm wide, sharply pointed, unequally bilobed, V-shaped, thick. Inflorescence 1 or 2 to a node, to 10cm long, .5mm thick, flowering successively from terminal. 3 sterile bracts. Pedicel 5mm long, yellow green, slightly twisted, ridged. Bract 1mm long, brown, pointed. Flower 11mm high, 13mm wide, full open, in all directions. Sepals and petals yellow; spur yellowish and brown orange; lip white; Dorsal sepal 7×2.5mm, widest at center, pointed tip, 5 veins. Lateral sepals 5×3mm, widest at center, pointed tip, joined along column foot. Petals 7×1.5mm, widest above center, pointed tip. Spur 3mm long, 2mm diameter at base; tip rounded; slightly cleft, brown orange; merging into lip, brown orange lines extending up into sidelobes; hollow, brown orange inside, hairy. Callus extending from inside spur and ending in wide

projection above base of midlobe, orange tip, covered with white hair; 2 small, yellowish calli under tip of large callus. Lip trilobed, white; sidelobes  $3 \times 3$  mm, square, tip rounded, edge hairy near midlobe, vertical violet stripes. Midlobe 1 mm long, 2 mm wide, triangular, blunt tip, edge and surface covered with white hair. Column foot short, broad, merging into spur indistinguishably, purple edges. Column off white, conical, deep triangular operculum. Small anther cap, white, deeply bilobed, beaked, 2 chambers. Pollinia, 2 pair of 2, short broad stipes. Blooms for one day only. Slight fragrance.

*Thrixspermum* sp. ADK 2447. Vientiane Plain, (ADK 2447). Blooms in September and thereafter.

Monopodial epiphyte, growing in large numbers along small tree branches. Stem to 11 cm, 4 mm thick, slightly compressed; 10 mm between leaves; roots from internodes, wiry; inflorescence from nodes, opposite leaves, sometimes two. Leaves to  $7 \text{ cm} \times 16 \text{ mm}$ , spotted with purple; tip cleft, either rounded with V-shaped cleft, or unequally bilobed. Inflorescence to 10 cm, scape, 9 cm; green and maroon; basal bract  $2 \times 2$  mm, square; 2 sterile bracts,  $12 \times 8$  mm, slightly pointed tip, Flower bract  $5 \times 2$  mm, sharply pointed, often purple. Pedicel white, 4 mm. Flowers 6 mm wide, 8 mm high, facing in all directions, blooming successively, veay short-lived, closed by noon; white. Dorsal sepal  $7 \times 2.5$  mm, widest above center, tip rounded, white, upper half flushed with violet. Lateral sepals  $8 \times 3.5$  mm, widest below center, tip pointed, white, upper half flushed with violet, reverse central vein violet; joined along column foot. Petals  $5.5 \times 2$  mm, widest at center, tip round, white. Spur projecting forward, saccate, round, slightly cleft, brown orange. Lip 3-lobed. Side lobes densely hairy, hair club-tipped; erect, brown-orange at base; 2 mm long, 1 mm high; tip triangular, pointing forward, brown-orange inside; upright callus at top front, white base, orange front. Midlobe very small, .8  $\times$  1 mm, triangular, pointed, white. Central groove bright orange, hairy, warty. Column white,  $2 \times 1$ , continued up around pollinia, side and back, with 2 chambers; distinct broad foot continued into base of lip with no break. Anther cap, white, loose. Pollinia pale yellow, 2 pair of 2, unequal, very short, broad stipes. Fruit to  $10.5 \text{ cm} \times 3$  mm.

\**Pteroceras clausum* (JJS) S. & S. Phou Pha, 500m, (ADK 1342); Phou Khao Khouai, 1500m, (ADK 1840). Bloomed in April.

\**Pteroceras laotica* SEID. Vientiane Plain, (ADK 0351). Blooms in May-June.

\**Pteroceras suaveolens* (ROXB.) HOLTT. Vientiane Plain, (ADK 1641). Blooms in September.

\**Chiloschista luniferus* (RCHB. F.) JJS. Vientiane Plain, rare, (ADK 1901). Blooms in April.

*Doritis pulcherrima* LINDL. Phou Khao Khouai, 1300m, (ADK 0885). Blooms in August.

*Phalanopsis cornu-cervi* (BREDA) BL. & RCHB. F. Phou Pha, 500m, (ADK 0522); Vientiane Plain, (ADK 1026). Blooms continuously from April through October.

\**Phalanopsis decumbens* (GRIFF.) HOLTT. Vientiane Plain, deep shade (ADK 0494). Blooms in August.

*Aerides multiflorum* ROXB. Vientiane Plain, dipterocarp forest, (ADK 0114). Blooms in May.

*Aerides odoratum* LOUR. var. *immaculata*. Vientiane Plain, dipterocarp forest, (ADK 0059). Blooms in June-July.

*Aerides flabellatum* ROLFE ex DOWNIE. source unknown, (ADK 2344). Bloomed in May.

*Aerides crassifolium* P. & R. Vientiane Plain, dipterocarp forest, (ADK 0050). Very common. Blooms in March.

*Aerides falcatum* LINDL. Vientiane Plain, (ADK 0574). Very common, blooms in March-April. A larger-flowered variety blooms in May-June.

\**Aerides houletteianum* RCHB. F. Paksane, (ADK 0297); Phou Pha, 700m, (ADK 0799). Blooms in March-April.

*Rhynchostylis retusa* BL. Vientiane Plain; scattered, not common, (ADK 0122). Blooms in May.

*Rhynchostylis coelestis* RCHB. source unknown, (ADK 2522). Blooms in May.

*Rhynchostylis gigantea* (LINDL.) RIDL. Vientiane Plain, fairly common, (ADK 0001). Blooms in December.

*Luisia*, cf. *brachystachys* BL. Pha Pek, 1300m, (ADK 2008). Bloomed in April.

\**Luisia grovesii* HOOK. F. Phou Pha 600m, (ADK 2027). Blooms in April.

Monopodial epiphyte. Stem to 70cm or more, pendulous; stems 3mm thick to 4mm at nodes; woody; to 3.5cm between leaves; roots from nodes near base. Leaves from nodes, terete, to 25cm long, 4mm diameter at base, tapering very gradually to blunt, unequal tip; all leaves in same plane, in same direction; basal sheath 6mm long surrounding stem. Inflorescence very short, 12×2mm, 8 or 9 flowers, buds very close together, blooming successively, a few days apart. Bract 1.5mm long, square. Pedicel 12mm long, white, slightly ridged, curved. Flower not full open, sepals and petals curved forward and inward, white; tongue dark velvet-maroon, with yellow leading edge. Dorsal sepal 9×4mm, sharp tip, hooded, inverted-V shape; white, upper center line and tip purple spotted; widest at base. Lateral sepals 10×5mm, rounded tip, hooded, inverted-V shape,



with tip forming pocket for side of mid lobe; joined together for 3mm at base; tip bright violet. Petals 15×1.5mm, rounded tip, equal width throughout; white, pale cream near tip. Lip 9mm long, 6.5mm across midlobe; trilobed; fixed to base of column; divided by narrow, arched groove into basal and apical sections. Sidelobes erect, .5mm high, 1.5mm long; highest at rear with round tip touching, touching column, sloping down to edge of basal section. Center between sidelobes black maroon, smooth, except at dividing line; basal section, 4mm long; apical section 5mm long. Midlobe fleshy, divided into five sections by deep parallel grooves; slightly warty. Leading edge, 1mm wide yellow, with sparse violet spots on surface and edge; edge fluted; tip round; reverse side yellow. Column pale green, operculum dark maroon, dark purple spot on center rear; 4×2.5mm; top round and jutting, forming with rostellum chamber which half hides anther; no column foot. Anther round, yellow, slight groove across top; joined to front of rostellum; 2 chambers. Pollinia 2, yellow, globular, on short, broad stipes.

\**Luisia psyche* RCHB. F. Vientiane Plain, dipterocarp forest, (ADK 0394). Blooms in April and thereafter.

\**Luisia* sp. Kerr 424. Vientiane Plain, open forest, (ADK 1320). Blooms in April.

Monopodial epiphyte, to 90cm tall, stems 4mm thick, to 6mm at nodes, woody; 3cm between leaves, roots from nodes. Leaves from nodes, terete, to 18cm long×3mm thick, thickest near base, tapering to sharp point, with basal sheath 3cm long surrounding stem. Inflorescence very short, to 7mm, up to 10 or more flowers, <sup>Lip,</sup> actual size buds very close together, blooming successively, a few days apart. Bract 4mm long, purple, pointed. Pedicel 6mm, purple-green, slightly ridged, curved. Flower not full open, petals and sepals pointing forward, pale violet; tongue dark velvet maroon. Dorsal sepal 6×2mm, round tip, hooded, 5 ridges, widest at base. Lateral sepals 7×3, tip forming pocket with sides overlapping and supporting lip; 5 ridges, bright violet; widest near tip. Petals 8×1.5mm, tip curved inward, 3 ridges, widest near tip. Lip 6×7mm, fleshy, trilobed, fixed to base of column, divided by deep, round groove into basal and apical sections. Sidelobes erect, 2mm long, 1mm high, rounded and turned inward. Center between sidelobes smooth. Midlobe fleshy, radial lines from groove almost to edge, dividing lip into warty sections; heart-shaped, with tip jutting out slightly; forward edge smooth with a few light colored-areas; covered with fine, dark hair on edge. White dots on basal section. Column yellow, 2×2mm, tapering toward tip. Anther cap yellow, round top, cleft; short, square beak. Pollinia 2, yellow, on short, broad stipes.

*Luisia* sp. ADK 2201. Phou Pha, 600m, (ADK 1329); Vientiane Plain, (ADK 2201). Blooms in March. Similar to preceding, except that lip is somewhat smaller and lacks the colored border.



*Luisia* sp. ADK 1438. Phou Pha 600m, (ADK 1438); Phou Khao Khouai, 300m, (ADK 2231). Blooms in May.

Monopodial epiphyte. Stem pendulous, long to 35cm, covered with brown leaf sheaths. Roots opposite leaves, inflorescence at nodes. Leaves terete, to 22cm long, 3mm diameter, very little taper, tip blunt, with short point; bright green; 2cm apart. Inflorescence short, 12mm, thick. 3mm, deep purple. Bracts short, 1.5mm, pointed, deep purple. Pedicel 15mm, gray green, twisted 90°, bent at 90° angle at ovary. Flowers 15×12mm, half-open, with dorsal sepal and petals curved forward over column; 2-3 flowers blooming at once, others successively; 4-6 flowers to an inflorescence. Dorsal sepal 8×3mm, widest at bottom, curved forward, tip blunt and hooded; almost same width entire length; greenish-white, faintly dotted with dark purple; 3 veins. Lateral sepal 8mm long, 4mm across one side of fold; folded over to envelop one side of lip, with tip of fold narrow, round; white, tip purple; not joined together. Petals 14×3mm, same width throughout; tip rounded to short point; white, shading to pale yellow at tip; curved forward and inward. Lip 9mm long, 5mm across side lobes, 9mm across base of midlobe; trilobed; thick and fleshy; completely dark purple, except for tip and sides of apical section, 2mm wide, pure white, no spots. Basal section almost perfectly round, 5mm diameter, smooth and glabrous, deep cleft separating from apical section. Small side-lobes, 1mm high, 2mm long, highest at rear, sloping down to cleft, joined immovably to column. Frontal section heart-shaped, 6mm long, 3 lines each side of center, surface rough, tip almost square. Column purple at junction of lip; pale green elsewhere, 4×3mm; operculum green; top rear raised, top sides sloping down to form seat for anther; short, square rostellum. No column foot. Anther cap white; short, square beak; 2 chambers; loose. Pollinia 2, yellow, ovoid; short, wide stipes and large, square disc.

*Vanda teres* LINDL. Vientiane Plain, (ADK 1963). Blooms in March. This species is widely variable in shape of lip and in color.

*Vanda laotica* GUILLEMAIN. Vientiane Plain, dipterocarp forest, (ADK 0123). Fairly common; blooms in February.

*Vandopsis gigantea* (LINDL.) PFITZ. Vang Vieng, (ADK 2144). Blooms in February.

\**Vandopsis lissochiloides* (GAUD.) PFITZ. Paksane, (ADK 1866). Bloomed in June.

*Renanthera coccinea* LOUR. Vientiane Plain. Fairly common, (ADK 0770). Blooms in March-April.

*Ascocentrum micranthum* LINDL. Vientiane Plain, very common, (ADK 0182). Blooms in January-February.

*Ascocentrum curvifolium* (LINDL.) SCHLTR. Source unknown, (ADK 1995). Blooms in March,

*Ascocentrum miniatum* (LINDL.) SCHLTR. Vientiane Plain, dipterocarp forest, (ADK 1994) Rare. Blooms in March.

*Ascocentrum ampullaceum* (LINDL.) SCHLTR. Vientiane Plain, very rare, (ADK 2003). Blooms in April.

*Staurochilus fasciatus* (RCHB. F.) RIDL. Vientiane Plain, heavy woods, (ADK 0004). Blooms in March-April.

\**Trichoglottis cirrhifera* T. & B. Vientiane Plain, rain forest, (ADK 0324). Blooms in January.

\**Pelatantheria ctenoglossum* RIDL. Vientiane Plain, fairly common, (ADK 0226). Blooms in August.

*Gastrochilus dasypogon* LINDL. Vientiane Plain, rain forests, (ADK 0159). Blooms in October.

*Gastrochilus bellinus* (RCHB. F.) O. Kze. Pha Pek, 600m, (ADK 2007). Blooms in March.

\**Robiquetia paniculata* (LINDL.) JJS. Vientiane Plain, (ADK 1491). Blooms in October.

\**Robiquetia spathulata* (BL.) JJS. Vientiane Plain, rain forest, (ADK 0528). Blooms in June.

\**Pomatocalpa setulense* (RIDL.) HOLTT. Vientiane Plain, rain forest, (ADK 0373). Blooms in February-March.

\**Pomatocalpa siamensis* (ROLFE ex DOWMIE) SUMM. Vientiane Plain, rain jungle, fairly common, (ADK 0866). Blooms in April.

*Sarcanthus lanatus* (LINDL.) HOLTT. Vientiane Plain, dipterocarp forest, (ADK 0176). Blooms in June.

\**Sarcanthus rostellatus* RIDL. Phou Khao Khouai, 1000m, (ADK 0993). Blooms in October.

\**Sarcanthus subulatus* (BL.) RCHB. F. Vientiane Plain dense rain forest; quite common, (ADK 0166). Blooms in May. Type A has leaves to 18×1.6cm, sharply pointed, with strong constriction about 2cm from tip; flower 13×7mm. Type B (ADK 1001) Phou Khao Khouai, 1000m, has leaves to 26cm or more, 2cm wide, with tip constricted, thickened and sharply pointed; flower 10×10mm.

\**Sarcanthus* sp. ADK 0158. Vientiane Plain, dipterocarp forest, (ADK 0157). Blooms in May.

Monopodial epiphyte. Stem 3cm long, 1cm wide, erect, covered with brown sheaths, many roots from base. Leaves to 13×2.2cm, thick fleshy, boat-shaped, tip unequally bilobed, lobes round; alternate, close, to 5mm apart. Inflorescence to 20cm, 3mm wide at base, lengthening as blooms move down, branched; bright green, covered with fine hair; many small flowers, facing in all directions, close together, blooming successively over a period of

over a month. 3 sterile bracts to 7mm long, brown, pointed; bract at branch 9×6mm, sharply pointed; flower bracts 7×4mm, light gray-green, persistent, pointed, covered with fine hair, inside and out, 5 veins. Pedicel 3×1mm, pale green, covered with fine hair. Flower full open, petals and sepals extending slightly forward, 5mm high, 4mm wide, white and brown-red; small, fat spur. Sepals and petals covered with fine hair, inside and out. Dorsal sepal, 3×2mm, widest below center, tip blunt, pale green, with red-brown lines extending upward from base. Lateral sepals 5×3mm, widest at base, tip blunt, pale green with strong red-brown center line outside, weak and pale inside; joined along column foot. Petals 2.5×1mm, widest below center, tip round, white, with small patch of pale brown at lower center. Spur cylindrical, tip round, gray-green, with red brown stripe down center, hairy, 2mm long, 1mm diameter at base, callus on back wall. Lip trilobed, 2.5mm long, 2mm wide, joined to column foot by back edges of sidelobes. Sidelobes erect, white, tipped with rose violet, 1.5mm long. Midlobe fleshly, rose-violet, edges white, shaped like triangle, with rounded corners; large, triangular callus at base, darker rose-violet with central light stripe extending into midlobe. Column foot short, pale green, .5×.7mm. Column bright green, 2×.7mm, 2 rounded projections pointing out at 45° angle each side of operculum; operculum deep. Anther cap yellow, with brighter eye-like spots each side; round; blunt-tipped beak pointing down at 45°; joined to back of column. Pollinia 2 pair of 2, globular, gray-white; stipes wide near pollinia, narrow at base. Seed pod 8×4mm, gray green, 5 sections, widest at center.

\**Sarcanthus* sp. Kerr 0347. Vientiane Plain, dipterocarp forest, (ADK 0715).

Blooms in September.

Monopodial epiphyte. Leaves close together, 8×1cm, thick and fleshy, coriaceous, unequally bilobed, pointed. Inflorescence pendant, 24cm or more long, scape 10cm, branched, maroon; many flowers blooming at once, beginning at upper end. Four equally spaced sterile bracts, 3×2mm, sharply pointed. Flower bracts 1×1mm; pedicel/ovary 8mm, pale purple, ridged. Sepals and petals yellow-green, with two violet stripes in center, sepals violet-tipped. Dorsal sepal 5×2mm, erect, slightly hooded at tip, pointed, widest near top. Lateral sepals 4×1.5mm, laterally pointing, bowed, purple spot on tip, blunt, widest above center. Petals 3.5×1mm, widest at center, blunt. Spur 3mm long, almost parallel to spur, 2mm wide at base, 1.5mm thick, pale violet in front, off-white in back. Lip trilobed, 3mm long, purple along top of spur. Sidelobes pale violet, up thrust, pointed, turned slightly in, tips apart; midlobe culminating in upthrust blunt white tip to same height as sidelobes. Backwall callus of spur 2.5×2mm, with back tips turned forward in sharp tip, white. Column deep violet, 2×1mm, horns pointing inward each side of rostellum; rostellum short beak, pointing down. Anther white, loose, eyelike dots at back corners, with



Backwall  
callus

short, sharp beak. Pollinia yellow, 2 pair of 2, elongate, with short broad stipes and long disc.

*Sarcanthus* sp. ADK 2373. Vientiane Plain, dipterocarp forest, (ADK 0213).

Blooms in September.

Monopodial epiphyte. Stem quite short, 4-5 leaves, close together. Leaves to 8cm×7mm, thick, coriaceous, with small constriction irregular in location, from 12 to 25mm from tip of leaf; tip sharp, with unequal lobes, short indentation; olive green, heavily tinged with purple near base and near tip. Inflorescence 17cm×1mm, dark purple, ridged, not branched; scape 8cm, with 4 equally spaced sterile bracts, 2×2mm, sharply pointed. Flower bracts minute. Pedicel/ovary 9mm, olive green, ridged, striped with deep purple. Flower 7mm wide, 10mm high, sepals and petals turned back at 45° angle, olive green and purple; lip mauve and bright violet. Dorsal sepal 5×1mm, widest above center, tip purple, blunt. Lateral sepals 4×1.5mm, widest below center, tip bright violet, blunt. Petals 3.5×1mm, widest at center, tinged with violet. Lip trilobed, with triangular spur parallel to pedicel, fleshy, tough and rigid. Sidelobes 1.5×2mm, erect, with sharply pointed tips pointing upward and somewhat inward, 1mm apart, pale mauve. Midlobe 1.5×2mm, erect, with sharp tip pointing upward, tip bright violet, rest pale mauve. Spur 2.5mm long, 2mm wide at base, 1mm thick, pale mauve, somewhat brighter at junction with lip. Callus between sidelobes on base of spur, 1.5×1.5mm, white, with toothed tip. Column 2×1mm, dull violet, bright violet stigma; short sharp horns at front, on either side of anther beak. Rostellum short, square; 2 bright violet knobs at base of column. Anther white, with short, triangular beak, eyelike circles at rear, loose, 2 chambers. Pollinia 4, 2 pair of 2, yellow, elongate; short, broad stipes.



Spur back-wall callus

*Sarcanthus mirabilis* RCHB. F. Vientiane Plain, rain forest, (ADK 0175) Phou Khao Khouai, 1500m, (ADK 1806). Blooms in March-April.

\**Sarcanthus siamensis* ROLFE ex DOWNIE. Vientiane Plain, dipterocarp forest, (ADK 0127). Blooms in October.

\**Sarcanthus flagelliformis* ROLFE ex DOWNIE. Vientiane Plain, very common, (ADK 0132). Blooms in July.

*Acampe longifolia* LINDL. Sayaboury, (ADK 0323); Vientiane Plain, (ADK 0970). Blooms in October.

*Acampe ochracea* (LINDL.) HOCHR. Vientiane Plain, rain forest, (ADK 0026). Blooms in December.

*Acampe papillosa* LINDL. Vientiane Plain, (ADK 0039). Blooms in November.

*Camarotis apiculata* RCHB. F. Vientiane Plain, (ADK 1508). Blooms in June,

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